

7. In the introduction to the Greenwich Second Ten-year Catalogue for 1890 a comparison is given for ten A. G. Catalogues. In a similar manner I have determined the mean differences $\Delta\alpha$ and $\Delta\delta$ from the 138 stars in Vienna and Greenwich Catalogues and for the thirty-six fundamental stars (Auwers). Proper motions have been applied. The following are the results :

$\Delta\alpha.$ $\Delta\delta.$ $\Delta\alpha.$ $\Delta\delta.$
 $-6^\circ \text{ to } -10^\circ -0^s.01 -0''.2$ 138 stars ; $-0^s.014 -0''.36$ 36 stars.

University Observatory, Oxford.

Detached Nebula in Cygnus. By W. S. Franks.

I was much interested in Dr. Max Wolf's paper on the remarkable nebula in *Cygnus* (*Monthly Notices*, vol. lxiv. p. 838), and thought it worth while to try it with the 20-inch reflector of this observatory. The accompanying photograph was obtained on 1904 November 12, with ninety minutes' exposure, between $21^h 36^m$ and $23^h 6^m$ local sidereal time ; sky clear, but partial moonlight (Moon five days old). Another photograph was obtained simultaneously with the 5-inch camera, but, as it corroborates Max Wolf's in every respect, it is not necessary to reproduce it also. The scale adopted is $1^{\text{mm}} = 30''$ of arc ; the extent of field shown is $1^\circ 22'$ from p to f and $57'$ from n to s , the centre of plate being roughly in R.A. $21^h 49^m.6$, Decl. $+46^\circ 48'$ (1900). [The scale of Max Wolf's picture does not quite conform to the description, being only one-third instead of one-half of the present one ; 1^{mm} on that is therefore equal to about $90''$, not $60''$.] Owing to the superior defining power of the reflector the detail is here more clearly shown than on the former plate, though the exposure was only ninety minutes as against four hours. Although it bears a family likeness to the "trifid" nebula in *Sagittarius* it is more complicated in structure ; and, situated as it is in such a remarkably void region, it becomes a very interesting object. I have often noticed the curious thinning out of stars in the immediate vicinity of nebulae, and undoubtedly there must be some physical cause to account for the fact, of which Sir W. Herschel was well aware. Is it possible that some of these objects are surrounded by *dark* and relatively cool nebulous matter, which, viewed in its greatest darkness round the edge, is sufficient to absorb and obliterate small stars behind it ? We have no ground for assuming that the nebulae generally are more distant than the stars ; indeed, from their vast apparent size they may be much nearer. Considering, too, how few of the stars show any sensible parallax it may be that some of the nebulae, when they are seriously attacked,

will yield positive results. The long barren channel preceding this detached nebula (only part of which is visible on the scale of this plate) is a very curious feature, and offers an inviting field for speculation.

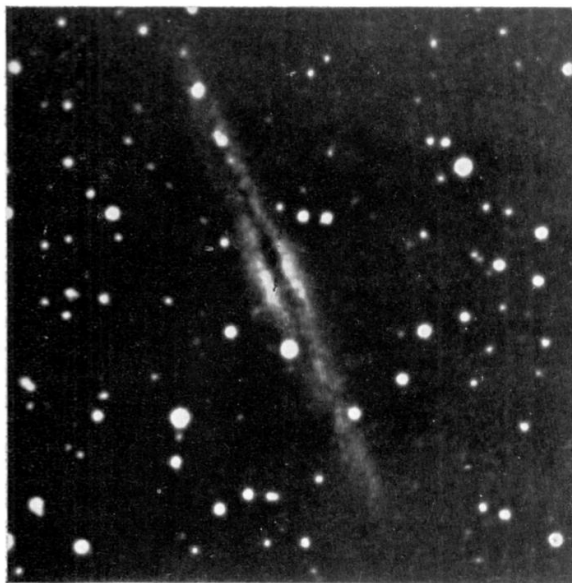
Starfield Observatory, Crowborough Beacon.

Dark Nebulosities. By W. S. Franks.

From time to time it has been hinted in a vague manner that, besides the ordinary self-luminous nebulosity, there exist in space certain forms of *non-luminous* nebulous matter, but, so far as I know, nothing definite has been advanced to account for such a phenomenon. However, that it does exist there can be little doubt after examining the evidence; I propose, therefore, to mention certain objects which exhibit this curious appearance. During the course of a considerable experience in nebular photography I have met with not a few of such, but have merely selected four of them as being good typical examples. As will be seen from the illustrations figs. 1, 2, and 3 belong to the "ray"-like nebulae, of which so many were detected by Lord Rosse; they are generally lenticular in section, and in all probability are spirals seen edgewise. A considerable proportion of these are characterised by a *dark* line or stripe along the major axis, apparently dividing the nebula into two parts parallel to each other. What is the cause of this appearance? That it is due to a real division of the nebula is almost inconceivable. It must be, I venture to assert, because the outer and attenuated edge of the nebula has cooled down so rapidly, relatively to the central hot and luminous mass, that where it crosses the latter (as it would do in an edgewise view) it simply stops its light by absorption and produces a dark band. I call it "dark" nebulosity advisedly, for it is really *darker* than the surrounding sky. This is even more strikingly seen on the negative (where it is, of course, *lighter* than the sky background). Its effect on the photographic plate is as though a screen were interposed between it and the sky, to stop the diffused light which always fogs the plate in a degree proportional to the length of exposure. In fig. 4 we have a modification of the usual form, the section being that of a double concave lens; but the dark band is there also, probably because the feeble outer nebulosity is densest along its centre. Possibly, too, some of the peculiar dark gaps which are shown in certain nebulae of irregular form may be in reality enormous real extensions in the line of sight of feebler and cooler nebulosity which intercept the light behind. [The figures are all to one scale: $1^{\text{mm}} = 12'' \pm$ of arc.]

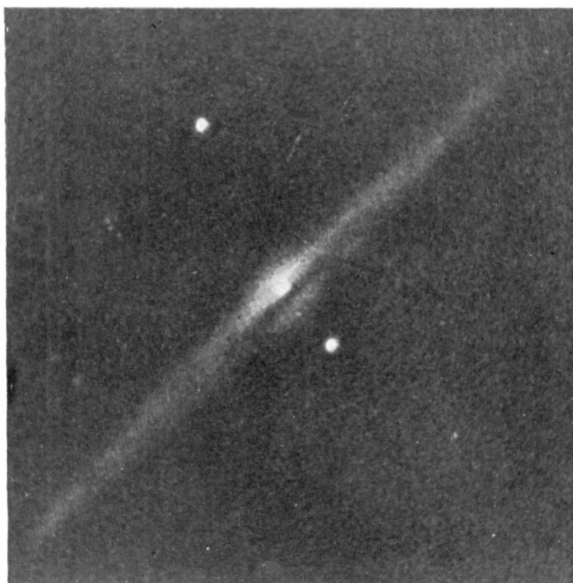
Starfield Observatory, Crowborough Beacon.

Fig. 1.



IC V 19 Andromedæ.

Fig. 2.



IC V 24 Comæ.

Fig. 3.



IC I 43 Virginis.

Fig. 4.



IC V 8 Leonis.

EXAMPLES OF DARK NEBULOSITIES.

Photographed by W. S. Franks.